# 280633 - Physics

**Coordinating unit:** 280 - FNB - Barcelona School of Nautical Studies  
**Teaching unit:** 748 - FIS - Department of Physics  
**Academic year:** 2020  
**Degree:** BACHELOR'S DEGREE IN MARINE TECHNOLOGIES (Syllabus 2010). (Teaching unit Compulsory)  
BACHELOR'S DEGREE IN NAVAL SYSTEMS AND TECHNOLOGY ENGINEERING (Syllabus 2010). (Teaching unit Compulsory)  
BACHELOR'S DEGREE IN MARINE TECHNOLOGIES/BACHELOR'S DEGREE IN NAVAL SYSTEMS AND TECHNOLOGY ENGINEERING (Syllabus 2016). (Teaching unit Compulsory)  
**ECTS credits:** 9  
**Teaching languages:** Catalan, Spanish

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## Degree competences to which the subject contributes

### Specific:
1. Understanding and mastering the basics of the general laws of mechanics, thermodynamics, fields and waves and electromagnetism and their application to problem solving principles of engineering.  
2. Understanding and mastering the basics of the general laws of mechanics, thermodynamics, and electromagnetism fields and waves and its application for solving problems of the technical field of naval engineering.

### General:
1. IDENTIFY I resoldre Capacitat PER L'Ambit problemes IN MARINA DE L'ENGINYERIA. Capacitat per the plantejament i resolució of problemes de l'Àmbit enginyeria assumint marina iniciatives, prenent decisions i aplicant solucions creatives in the marc d'una systematic methodology.

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## Teaching methodology

- Receive, understand and synthesize knowledge  
- Set up and solve problems and questions related with the subject  
- Develop rational thinking and criticism, and expose and support the reasonings (orally or in written form)  
- Perform individual work  
- Perform tasks in a reduced team.

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## Learning objectives of the subject

- Understand and master the basics of the general laws of mechanics, thermodynamics, and wave fields, and electromagnetism.  
- Apply basic physical principles to solving problems of engineering.  
- Set up the problems correctly from the proposed statements and identify options for resolution. Apply the appropriate method of resolution.  
- Perform the tasks on schedule, according to the guidelines set by the teacher or tutor. Identify progress and the degree to which learning objectives.
## Study load

<table>
<thead>
<tr>
<th>Total learning time: 225h</th>
<th>Hours large group:</th>
<th>45h</th>
<th>20.00%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Hours medium group:</td>
<td>36h</td>
<td>16.00%</td>
</tr>
<tr>
<td></td>
<td>Hours small group:</td>
<td>9h</td>
<td>4.00%</td>
</tr>
<tr>
<td></td>
<td>Guided activities:</td>
<td>9h</td>
<td>4.00%</td>
</tr>
<tr>
<td></td>
<td>Self study:</td>
<td>126h</td>
<td>56.00%</td>
</tr>
</tbody>
</table>
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## Content

<table>
<thead>
<tr>
<th>Mechanics.</th>
<th>Learning time: 51h</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Theory classes: 12h</td>
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<tr>
<td></td>
<td>Practical classes: 12h</td>
</tr>
<tr>
<td></td>
<td>Laboratory classes: 2h</td>
</tr>
<tr>
<td></td>
<td>Guided activities: 1h</td>
</tr>
<tr>
<td></td>
<td>Self study : 24h</td>
</tr>
</tbody>
</table>

### Description:

### Related activities:
- Reading of chapters of books specified in the bibliography, or notes.
- Listen to the teacher and participate in problem-solving.
- Solve problems individually.
- Performance of two experimental works with the simulator (computer). The first one relative to the movement and stop of boats; and the second related to pendulum movements and the determination of the acceleration of gravity.

### Specific objectives:
- Understand and master the basic concepts about the general laws of mechanics.
- Apply the basic physical principles of mechanics to the resolution of simple problems.
- Propose correctly the simple mechanical problems from the proposed statements and identify the options for their resolution.

<table>
<thead>
<tr>
<th>Oscillations.</th>
<th>Learning time: 32h</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Theory classes: 8h</td>
</tr>
<tr>
<td></td>
<td>Practical classes: 6h</td>
</tr>
<tr>
<td></td>
<td>Laboratory classes: 2h</td>
</tr>
<tr>
<td></td>
<td>Self study : 16h</td>
</tr>
</tbody>
</table>

### Description:

### Related activities:
- Read the book chapters related to the oscillations of some of the recommended bibliography books.
- Listen to the teacher the indications on the ways to solve the simple exercises.
- Perform simple exercises on oscillations, autonomously
- Perform an experimental work with pendulums, and deliver the report of it.

### Specific objectives:
- Understand and master the basic concepts about the general laws of vibrations.
- Propose correctly the simple problems of oscillations from the proposed statements.
### Waves.

**Description:**

**Related activities:**
- Read the chapters corresponding to waves in one of the books of the recommended basic bibliography.
- Listen to the teacher’s instructions on solving problems.
- Solve some problems on the subject.
- Perform three experimental works with the simulator on aspects of waves.

**Specific objectives:**
- Understand and master the basic concepts about the general laws of the waves.
- Propose correctly the wave problems from the proposed basic statements.

### Thermodynamics and thermal properties of matter.

**Description:**

**Related activities:**
- Read the chapters corresponding to thermodynamics in one of the books of the recommended basic bibliography.
- Listen to the teacher’s instructions on solving problems.
- Solve some problems on the subject.
- Perform an experimental practice (cooling a body) with a digital thermometer, and write the report.

**Specific objectives:**
- Understand and master the basic concepts about the general laws of Thermodynamics.
- Propose correctly the simple problems of thermodynamics from the basic statements proposed.
### Electricity and magnetism.

**Description:** Concepts of charge and electric field. Electric current. Basic laws of the electric and magnetic fields. Quasistatic magnetic field; sources and effects. Effect of the magnetic field on a magnetic moment (part of STCW A-II_1_I: Compass - magnetic and gyro. Knowledge of the principles of magnetic and gyro-compasses). Electric and magnetic fields and materials. Electromagnetic induction. Generators.

**Related activities:**
- Read the chapters corresponding to waves in one of the books of the recommended basic bibliography.
- Listen to the teacher’s instructions on solving problems.
- Solve some exercises on magnetic fields.
- Perform an experimental practice (magnetic field of a magnet), and write the report.

**Specific objectives:**
- Understand and master the basic concepts about the general laws of electromagnetism.
- Propose correctly the simple problems on the magnetic field from the proposed basic statements.

**Learning time:** 32h  
Theory classes: 8h  
Practical classes: 6h  
Laboratory classes: 2h  
Self study: 16h

### Electromagnetic waves, light and properties.

**Description:** (ENG) Descripció de les ones electromagnètiques. Radiació electromagnètica i llum. Mesura i propietats de la llum. Els raigs de llum i la òptica. Radiació tèrmica, quantització i fenòmens relacionats.

**Related activities:**
- Read the chapters corresponding to electromagnetic waves in any of the books of the recommended basic bibliography.
- Resolve some issues and problems on the subject

**Specific objectives:**
- Understand and master the basic concepts about the general laws of electromagnetic waves.

**Learning time:** 20h  
Theory classes: 6h  
Practical classes: 4h  
Self study: 10h
**Qualification system**

It is mandatory to perform the practical exercises

The final degree will be given according to:

\[ N_{\text{final}} = 0.45 \times N_{\text{pf}} + 0.25 \times N_{\text{lab}} + 0.30 \times N_{\text{parcials}} \]

If one of the activities of laboratory or continuous evaluation is not carried out, it will be considered as not evaluated. It will be considered not submitted: the student who has not been evaluated for tests that equal or exceed 25% of the total score of the subject.

The students that do not succeed, in the conditions determined by the University and the Faculty, may follow a re-evaluation, an exam (qualified as Nre) in a date determined by the faculty, and the final grade will be obtained as

\[ N_{\text{final}} = 0.75 \times N_{\text{re}} + 0.25 \times N_{\text{lab}} \]

Where the N\text{lab} is obtained from laboratory and simulators' activities, that might be completed at the moment of the re-evaluation.

N\text{final}: final grade.
N\text{pf}: final exercise.
N\text{lab}: laboratory and simulators.
N\text{parcials}: partial exams.

Partials will last up to 3 h

**Regulations for carrying out activities**

Activities not performed by the student will not receive a grade
A student will receive a grade of "Not presented" if the student do not perform tasks that add 35% or more of the total grade
Bibliography

Basic:


Complementary:


Others resources:

Hyperlink

http://baldufa.upc.edu